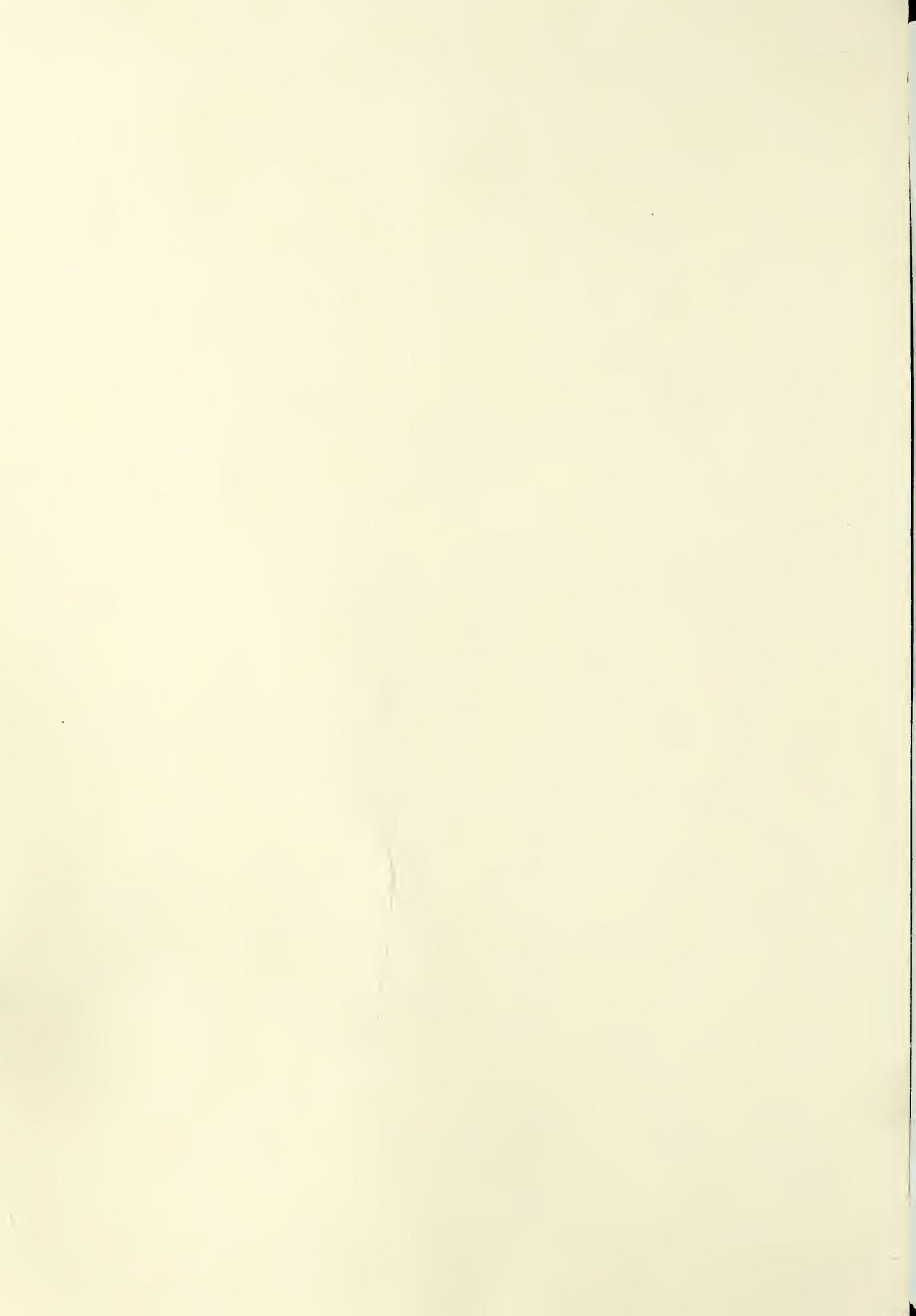


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TECHNICAL EQUIPMENT REPORT NO. 5700-3

FEBRUARY 1962

# CARGO DROPPING INSTALLATION FOR DeHAVILAND BEAVER DHC-2 SEAPLANE

BY

ELY SERVICE CENTER  
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE  
ELY, MINNESOTA



ISSUED BY  
FOREST SERVICE  
U. S. DEPARTMENT OF AGRICULTURE  
WASHINGTON, D. C.





UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
WASHINGTON 25, D.C.


IN REPLY REFER TO

5700

February 12, 1962

The paracargo mountings and containers for DeHavilland Beaver DHC-2 Seaplane described in Technical Equipment Report No. 5700-3 are approved for optional U.S. Forest Service use. Specifications, including reduced drawings, are in the report. Full-size drawings may be obtained from the Regional Forester, North Central Region, Forest Service, 710 N. 6th Street, Milwaukee 3, Wisconsin.

When containers are attached to cargo shackles on the DeHavilland Beaver, the aircraft is subject to the limitations of CAR Part 8 and no passengers will be carried.

  
MERLE S. LOWDEN, Director  
Division of Fire Control





February 12, 1962

CARGO-DROPPING INSTALLATION FOR DeHAVILLAND BEAVER DHC-2 SEAPLANE

INTRODUCTION

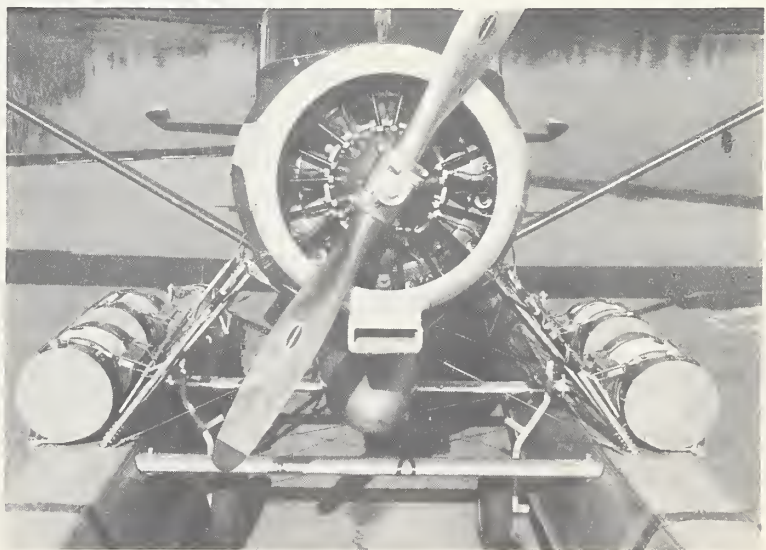
Forest fires that start in inaccessible areas have always presented the difficult problem of getting adequate supplies and equipment to the service crews so they can work with a reasonable degree of efficiency. The dropping of cargo into such areas has been done almost from the time the airplane was invented. Reasons varied, but usually dropping was the quickest way in an emergency.

Prior to 1957 on the Superior National Forest, equipment and supplies had been paracargoed in a Noorduyn Norseman Seaplane to firefighting forces in the Wilderness Boundary Water Canoe Area. Repeated passes were necessary over the drop area, because only one container could be dropped with each pass. Although this method was effective, it was slow and required two droppers besides the pilot.

In 1957 a DeHavilland Beaver DHC-2 Seaplane was purchased. The new seaplane had a 17-inch cargo dropping hatch in the floor compared with a 27-inch hatch in the Noorduyn. This meant many of the cargo containers in use were no longer suitable. It was not practical to drop cargo and parachutes through the doors because of the danger of snagging on the pontoons.

The objective of this project was to develop cargo dropping accessories that would permit carrying the loads on the floats, and dropping cargo containers individually or several at one time.

The racks, containers, and techniques described in this report were designed specifically for use on the DeHavilland Beaver Seaplane. With minor modifications, they can be adapted for use on almost any pontoon-equipped seaplane.



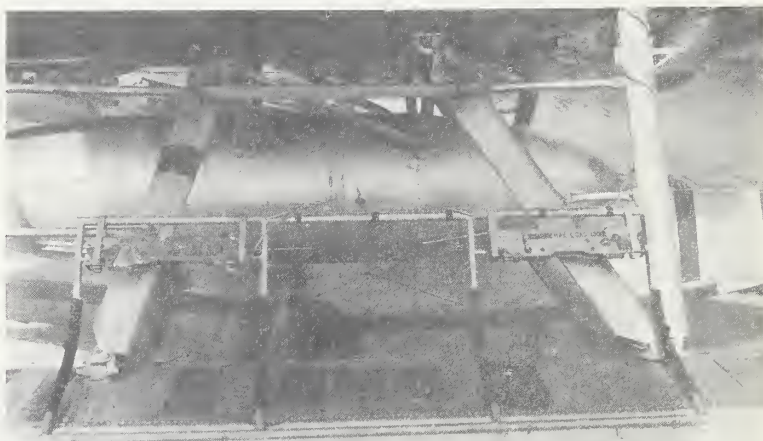


The problems to be solved were: (1) Designing racks that could be quickly attached to the pontoons; (2) constructing a combined electrical and mechanical release--the electrical release to work for an individual container and the mechanical to work collectively in an emergency; (3) determining size of containers, type of container material, and packaging of contents to assure undamaged arrival; (4) determining seaplane characteristics with loaded containers, and clearance of cargo and parachute after release, for safe and efficient performance.

In general, the objectives of the project have been met. Four containers can be paracargoed either individually or collectively, electrically or manually, from the pontoons. The cabin space formerly used for cargo is freed, and the cargo-dropping operation does not interfere with the water dropping tank (See TE Report 5700-4 "Forest Fire Fighting Tank for DeHavilland Beaver DHC-2 Seaplane"). Only a pilot is needed for the operation. Tests are currently being made to find more economical, disposable containers.

#### DESIGN AND DETAILS OF CARGO RACKS AND CONTAINERS

Racks will hold either one or two containers on each float. They are made of 4130 chrome molybdenum stock and fastened to the floats by three 1/4-inch eye-bolts at outboard edge of flat deck. Top of racks bolted to clamp on float struts. Eye-bolts are Edo Part No. 00-W-8J0. (See drawing at center of report.)



Rubber hose 18 inches long, 3/4-inch ID, slipped onto upright tubing, prevents containers from slipping upon release. Bomb shackles, converted, S-2 type are used for each container for either manual or electrical release.

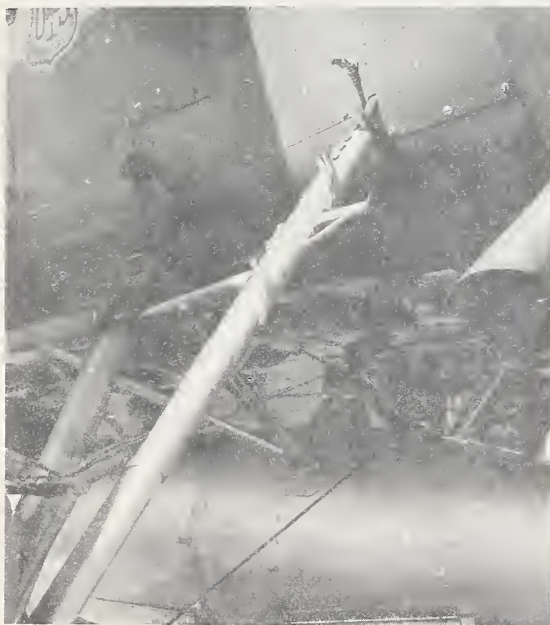
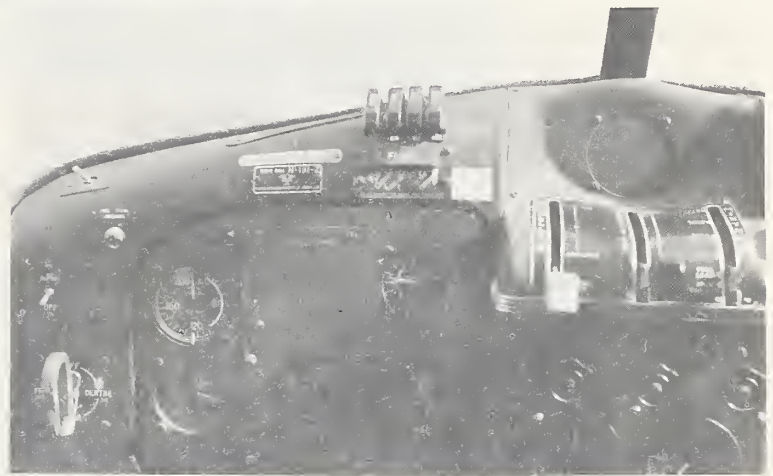
Selective dropping is possible with electric control; one or more containers can be released as desired. Manual emergency release, within easy reach of pilot, will release all containers at once.





Single, packaged container mounted and ready for either manual or electrical release.

Selective electrical-release switches are mounted above instrument panel. Switches are spring-loaded, toggle type, normally off, with safety covers.

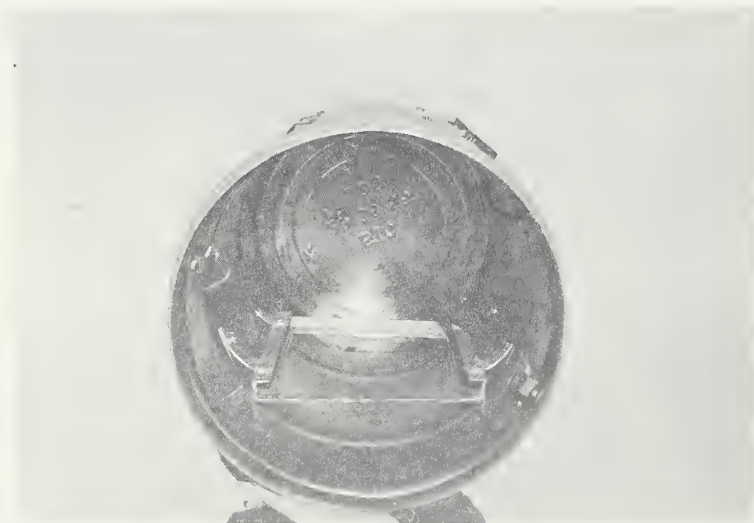


Electrical wire is permanently attached to the rack and connected by a Cannon plug to switch.

For mechanical release, see plan Part Nos. 13, 15, and 16. Manual release in this plan is incorporated with manual water release of water dropping tank (See T.E. Report 5700-4 "Forest Fire Fighting Tank for DeHavilland Beaver DHC-2 Seaplane").



Details of steel strap bolted to container (plan part No. 18). Strap is easily removed for salvage.



Container with bolted-in bracket to hold pumper. Thirty-gallon steel drums were mainly used as containers for this project. Fibre and plywood containers of approximately the same size were tested. Where added protection is necessary, as for pumbers and powersaws, steel containers are recommended.



Complete package of Pacific Marine 5A7 pumper, 300 feet of 1-inch hose, suction hose, accessories, and 1 gallon of mixed gas.



The equipment shown above is packaged in one container. Parachute nests on top, and plywood bulkhead bolts on. Note in photo at left that parachute is held securely to bulkhead by 1-1/2-inch webbing and one turn of No. 8 break cord.





Packaged container complete with harness. Protective covering of 30/30/30 asphalt laminated creped paper, 33-percent stretch, is placed tightly over parachute and held to outside of container by two turns of 1-inch masking tape. Contents and total weight are printed on cover. A minimum of 95 pounds and a maximum of 175 pounds have been established as total weight of loaded container.

Static line is folded and enclosed under the paper cover with 1/4-inch tape (Spec. #Mil-T-5661B); protruding through the paper, the tape serves as a break cord for tying to cargo rack. Entire package, including static line, leaves aircraft.

Two 30-gallon drums are bolted together for packaging equipment that does not conveniently fit into one container.



Inspections.--FAA certification on seaplane paracargo racks and container installation and operation is under plan Part 8 CAR, Restricted Category (See drawing at center of report).

Drawings.--Authorized contractors and cooperators working with the Forest Service can obtain full-size working drawings of Cargo Dropping Equipment for DHC-2 Beaver Aircraft by writing to the Regional Forester, North Central Region, 710 North 6th Street, Milwaukee 3, Wisconsin.







PART 14 IS A TYPE SE ELECTRICALLY OPERATED BOMB SHACKLE  
SPEC. 24993, ORDER NO. AF 33 (038)-14939 BY AVCO.

PART NO. 15 IS EXTRAFLEXIBLE  $\frac{1}{8}$ " CABLE

PART NO 17 IS 2 1/2" BOLT, EDO PART NO.00-W-BJO EYEBOLT THREE FOR EACH  
MOUNTING FOR DAVIS A,B,C. TWO EACH SIDE REPLACING BOLTS IN STEPS  
HOLDING PARTS 5 & 11

